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EXAMINER	
MCCRACKEN, DANIEL	
ART UNIT	PAPER NUMBER
1793	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DocketingDept@young-thompson.com

Office Action Summary	Application No.	Applicant(s)	
	10/591,954	KAUPPINEN ET AL.	
	Examiner	Art Unit	
	DANIEL C. MCCRACKEN	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 January 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *55-91* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *55-89* is/are rejected.

7)☒ Claim(s) *66,90 and 91* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Citation to the Specification will be in the following format: (S. # : ¶/L) where # denotes the page number and ¶/L denotes the paragraph number or line number. Citation to patent literature will be in the form (Inventor # : LL) where # is the column number and LL is the line number. Citation to the pre-grant publication literature will be in the following format (Inventor # : ¶) where # denotes the page number and ¶ denotes the paragraph number.

Election/Restrictions

Applicant's election with traverse of Group I (Claims 55-71) in the reply filed on 1/19/2010 is acknowledged. The traversal is on the ground(s) that:

> First, as would be clear to one reading the present application, the Applicant is of course not trying to patent "carbon nanotubes" in general or manufacturing or use thereof. As clearly defined in claims 55, the present invention is based on general principles comprising:
> - CNT formation in a gas phase;
> - separation of the catalyst particle production and the actual CNT synthesis, thus enabling controlling and optimizing these two stages independently; and
> - using one of the three listed processes to produce the catalyst particles.
>
> These features form the "general inventive concept" of the present invention.

(Remarks of 1/19/2010 at 3). This statement in and of itself is not persuasive because these arguments are not commensurate with what is actually required of Claim 55. Similarly, the relevance of a "general inventive concept" (versus what is claimed) to the restriction requirement is not understood. However, upon reconsideration, the Examiner considers Groups I-III (Claims 55-82) as set forth in the Restriction Requirement of 9/16/2009 to be one of the combinations of

claims permitted in MPEP 1850. *See* MPEP 1850 III. A. (C). Claims 83-91 however require additional features/limitations (coatings, polymers, liquids, pastes, functional groups, etc.) that are not the result of the particular process or apparatus claimed. These groups lack unity *a priori* by requiring features not addressed in the apparatus/method claims - *i.e.* the method does not inherently result in the products claimed (e.g. no method steps for adding polymers, creating colloids, etc.) and the product is not specially adapted for making the products (*e.g.* no features for making films, coating, etc.). All of that said, in light of examining Groups I-III, Groups IV-VIII will be examined. In sum, the restriction requirement is WITHDRAWN. Claims 55-91 will be examined.

Information Disclosure Statement

The information disclosure statements (IDS) submitted on 9/8/2006, 12/11/2006 and 1/11/2007 were filed prior to the first action on the merits. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Objections

I. Claims 66 and 90-91 are objected to under 37 CFR 1.75(c) as being in improper form.

Note that Claim 66 refers to itself ("66 (new) A method according to claim 66,"), *i.e.* it does not limit any claim and it is impossible to determine the scope of the claim contemplated.

Claims 90-91 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only. See MPEP § 608.01(n). Accordingly, claims 90-91 have not been further treated on the merits.

Claim Construction – Discussion:

MPEP 2181 discusses claims invoking 35 U.S.C. 112, ¶6 and provides the following three-prong analysis for determining whether 35 U.S.C. 112, ¶6 is invoked. Under the analysis:

> (A) the claim limitations must use the phrase "means for " or "step for; "
> (B) the "means for " or "step for " must be modified by functional language; and
> (C) the phrase "means for " or "step for " must not be modified by sufficient structure, material, or acts for achieving the specified function.

MPEP 2181 I. Here, Claims 72-76 all use the phrase "means for." Likewise, the "means for" language is modified by functional language in all claims – *i.e.* "producing catalyst particles" Finally, Claims 72 and 75 do not recite any structural elements that would withdraw the claims from the "112, ¶6" realm. Claims 73-74 and 76 however contain structural features - *i.e.* "pre-reactors," "hot wire generator," and "surfaces of the reactor," respectively - that preclude application of §112, ¶6.

As such, given that the three-prong test is satisfied for Claims 72 and 75, these limitations are being treated under 35 U.S.C. 112, ¶6. *See* MPEP 2181 I. ("Where a claim limitation meets the 3-prong analysis and is being treated under 35 U.S.C. 112, sixth paragraph, the examiner will include a statement in the Office action that the claim limitation is being treated under 35 U.S.C. 112, sixth paragraph."). Claims 73-74 and 76 are not. This finding is made once for brevity's sake, but to the extent it is necessary to support any rejection *infra*, it is expressly incorporated therein by reference.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

I. Claims 72 and 75 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The analysis for examining means-plus-function limitations for compliance with 35 U.S.C. 112, first paragraph is set forth in MPEP 2181 IV. MPEP 2181 IV states:

> In the situation in which the written description only implicitly or inherently sets forth the structure, materials, or acts corresponding to a means- (or step-) plus-function, and the examiner concludes that one skilled in the art would recognize what structure,

> materials, or acts perform the function recited in a means- (or step-) plus-function, the examiner should either: (A) have the applicant clarify the record by amending the written description such that it expressly recites what structure, materials, or acts perform the function recited in the claim element; or (B) state on the record what structure, materials, or acts perform the function recited in the means- (or step-) plus-function limitation. **Even if the disclosure implicitly sets forth the structure, materials, or acts corresponding to a means- (or step-) plus-function claim element in compliance with 35 U.S.C. 112, first and second paragraphs, the USPTO may still require the applicant to amend the specification pursuant to 37 CFR 1.75(d) and MPEP § 608.01(o) to explicitly state, with reference to the terms and phrases of the claim element, what structure, materials, or acts perform the function recited in the claim element.**

(emphasis added). The Specification has been reviewed, but does not appear to recite which structure or material perform the functions recited in the claims. While Applicants do employ "means for" language in the Specification (primarily in the "Description of related Art" at S. 1: 18 *et seq.*), this is not in the context of describing the claimed functions (*i.e.* for producing catalyst particles). The "means for producing" language appears to have been added by the preliminary amendment dated 9/8/2006 and does not appear to be part of the original disclosure. As such, the claims are rejected as lacking support for the structure, material, or acts corresponding to the functional language employed. Note the bolded passage from MPEP 2181 IV that suggests this rejection can be obviated by amending the specification to explicitly state what structure, materials or acts perform the function recited in the claim element.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

I. Claims 66, 72, 75, 79 and 81-89 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 66 depends on itself. It is impossible to determine the scope of the claim. For purposes of applying prior art, it is assumed that Claim 66 was to depend on Claim 65. However, it is incumbent on Applicants to correct this ambiguity.

MPEP 2181 II-III addresses the relationship between "means-plus-function" limitations and the "definiteness" requirement of 35 U.S.C. 112, ¶2. "The proper test for meeting the definiteness requirement is that the corresponding structure (or material or acts) of a means (or step)-plus-function limitation must be disclosed in the specification itself in a way that one skilled in the art will understand what structure (or material or acts) will perform the recited function." MPEP 2181 II. (citations omitted). Here, Claims 72 and 75 fail, as the corresponding structure was not disclosed. The "means for" language appears to have been added later, after the filing of the original disclosure. Furthermore, claiming the only disclosed structure in dependent claims (*e.g.* Claims 73-74) obscures what structure actually corresponds to the claimed function in that this format of drafting suggests that the structure is not limited to that disclosed and claimed in the dependent claims.

Claim 79 recites a host of process or use steps, but not structural features. As such, it is not clear what structural features are required of the apparatus or reactor by these use steps..

Claims 81-82 depend from Claim 80 and recite features that are introduced with the definite article "the," *e.g.* "the length, the attached functional groups," etc. These terms lack antecedent basis. Likewise, there is no antecedent basis in the original process claim (Claim 55) for these structural and/or compositional features.

Claims 83-85 obscure what is required by the claim. The preamble states "carbon nanotubes," but the claims introduce features that are clearly describing a composite. It is also noted that the process steps for adding these featues are not present in Claim 55, from which these claims ultimately depend or import the features from.

Claim 86 provides for the use of carbon nanotubes, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced. This claim drafting style makes it impossible to determine what structural features are to be imparted to this "product-by-use" or "product-by-process" claim. Claims 87-89 import these ambiguities.

Claim 86 is rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd.* v. *Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966). Claims 87-89, which depend on or import Claim 86 are rejected for the same reasons.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

I. Claims 55-59, 63-67, 70, 72-73, 75-76 and 79 are rejected under 35 U.S.C. 102(b) as being anticipated by Kamalakaran, *Synthesis of thick and crystalline nanotube arrays by spray pyrolysis*, Applied Physics Letters 2000; 77(21): 3385-3387 (hereinafter "Kamalakaran at __") in view of Zhang, et al., *Rapid growth of well-aligned carbon nanotube arrays*, Chemcial Physics Letters 2002; 362: 285-290 (hereinafter "Zhang at __") to show a state of fact.

With respect to Claim 55, this claim requires "producing catalyst particles by physical vapor nucleation of catalyst material or by solution droplet thermal decomposition of catalyst precursor or by aerosolization from a powder or suspension." Kamalakaran teaches forming an aerosol of catalyst material from a solution/suspension. (Kamlakaran at 3385, col. 2; "Fig. 1"). Heating of the ferrocene is recognized in the art as making catalyst particles. The evidence provided is Zhang. *See* (Zhang at 286, col. 2) ("Ferrocene acts as a producer for Fe catalyst particles."). Note that, with respect to the Zhang reference, multiple reference 102 rejections are in fact permissible. *See* MPEP 2131.01. Claim 55 further requires "using said catalyst particles and one or more carbon sources in a reactor to produce carbon nanotubes." Kamalakaran teaches thermally decomposing a carbon source (benzene) to make nanotubes. *See e.g.* (Kamalakaran at 3385, col. 1). This is all that the claim requires and note that the claim does not exclude a spray pyrolysis method. The catalyst particle is formed and the nanotube is then grown. (Kamalakaran at 3387, col. 1). As to Claim 56, the catalyst precursor (ferrocene) contains a metal (iron).

(Kamalakaran at 3385, "Fig. 1"). As to Claim 57, Kamalakaran teaches evaporation of the catalyst by a radiatively heated metal or alloy, *i.e.* the furnace. (Kamalakaran at 3385, col. 2). As to Claim 58, radiative heat transfer occurs from the furnace to the tube. *Id.* As to Claim 59, heating of the ferrocene decomposes to form catalyst particles. Carbon nanotubes are then formed. See discussion of Claim 55. As to Claim 63-64, benzene is taught. (Kamalakaran at 3385, col. 1). As to Claim 65-66, Kamalakaran discloses using another reagent, acetone. (Kamalakaran at 3385, col. 2). As to Claim 67, this claim recites numerous "and/or" clauses. The claim, *by virtue of the way it was written*, can be interpreted in numerous ways. The Examiner, for purposes of this rejection, is interpreting Claim 67 as only requiring purification of the amorphous carbon. Stated differently, the Examiner is interpreting the claim disjunctively. Kamalakaran teaches reacting the reagent (acetone) with the amorphous carbon/soot to purify the nanotubes. (Kamalakaran at 3385, col. 2). As to Claim 70, the temperature is controlled. *Id.*

With respect to Claim 72, this claim requires "means for producing catalyst particles by physical vapor nucleation of catalyst material or by solution droplet thermal decomposition of catalyst precursor or by aerosolization from a powder or suspension." Kamalarakaran teaches means for producing catalyst particles. (Kamalarakaran "Fig. 1"). Claim 72 further requires "one or more reactors for producing carbon nanotubes using said catalyst particles and one or more carbon sources." A reactor is taught. *Id.* As to Claim 73, a "pre-reactor" is taught. (Kamalakaran "Fig. 1") (note container for benzene/ferrocene). As to Claim 75, Kamalarakaran teaches a source for supplying energy to the reactor. *Id.* (furnace). As to Claim 76, the means for producing the catalyst particle contains ferrocene, *i.e.* material included in one or more catalyst particles. *Id.* As to Claim 79, wall temperature is controlled. *Id.*

II. Claims 55-59, 63-68, 70, 72-76 and 79 are rejected under 35 U.S.C. 102(b/e/a) as being anticipate by WO 03/056078 to Dillon, et al. (US 2004/0265211 A1) in view of Zhang, et al., *Rapid growth of well-aligned carbon nanotube arrays*, Chemcial Physics Letters 2002; 362: 285-290 (hereinafter "Zhang at __") to show a state of fact.

Note that Dillon is applicable under various sections of the statute. The instant application draws priority from an international application with a filing date of 3/9/2005. The Dillon WIPO document was published on 7/10/2003. As such, Dillon is 102(b) art against the international filing date. Should applicants perfect their foreign priority (by filing a translation, etc. - *see e.g.* 35 U.S.C. 119(b)(3)) and be accorded their Finland filing date of 3/9/2004, the Dillon reference is applicable under 102(a). Note also that the corresponding US pre-grant publication is available under 35 U.S.C. 102(e). For brevity's sake, reference shall be made to the WIPO publication, although Applicants should be aware of the US PGPUB, etc. The same rejection over the US PGPUB is applicable, *mutatis mutandis*. Finally, with respect to the Zhang reference, note that multiple reference 102 rejections are permissible. *See* MPEP 2131.01.

With respect to Claim 55, this claim requires "producing catalyst particles by physical vapor nucleation of catalyst material or by solution droplet thermal decomposition of catalyst precursor or by aerosolization from a powder or suspension." Dillon teaches physical vapor nucleation of a catalyst. *See* (Dillon 5: 5-12). Note that Dillon employs a hot wire, the same technique disclosed in Applicants specification at (S. 3: 17). Note that while Dillon does not state *in haec verba* "producing catalyst particles," it is recognized in the art that heating ferrocene (the catalyst material disclosed by Dillon) will decompose into catalyst particles, and therefore this is an expected or inherent feature of Dillon by virtue of heating the ferrocene. The evidence provided is Zhang. *See* (Zhang at 286, col. 2) ("Ferrocene acts as a producer for Fe catalyst

particles."). Claim 55 further requires "using said catalyst particles and one or more carbon sources in a reactor to produce carbon nanotubes." Dillon teaches producing nanotubes with the catalyst. *See e.g.* (Dillon 5: 9-12). As to Claim 56, Dillon teaches ferrocene, which contains iron. (Dillon 5: 18). *See also* (Dillon 10: 17-27). As to Claim 57, resistively heated wires are taught. *See e.g.* (Dillon 5: 5). As to Claim 58, Dillon teaches heat transfer that is conductive (in the case where the ferrocene contacts the hot wire) and radiative (in the case where ferrocene doesn't contact the wire). *See generally* (Dillon 5: 5-18). As to Claim 59, the particle is produced before (albeit slightly before) the nanotube is grown. See discussion of Claim 55. As to Claim 63, carbon sources are taught. (Dillon 16: 10) (methane carbon precursor). As to Claim 64, methane is taught. *Id*. As to Claim 65, at least one or more reagents are taught. *See generally* (Dillon 16: 1 *et seq*.) (Example 1, note addition of hydrogen, methane and ferrocene). As to Claim 66, and notwithstanding the ambiguities noted elsewhere, the reagents at least participate in a reaction with the catalyst to form a nanotube. *Id*. As to Claim 67, for purposes of this rejection the claim is interpreted disjunctively and as only requiring the reaction with the catalyst to form nanotubes. Dillon teaches this. *See Id*. As to Claim 68, hydrogen is taught. (Dillon 16: 3). As to Claim 70, the presence of a power supply (Dillon "Fig. 1") and recitation of "maintaining" a temperature suggests at least temperature control. *See e.g.* (Dillon 16: 9-20).

With respect to Claim 72, this claim requires "means for producing catalyst particles by physical vapor nucleation of catalyst material or by solution droplet thermal decomposition of catalyst precursor or by aerosolization from a powder or suspension." Dillon teaches physical vapor nucleation of a catalyst. *See* (Dillon 5: 5-12). Note that Dillon employs a hot wire, the same technique disclosed in Applicants specification at (S. 3: 17). Claim 72 further requires "one

or more reactors for producing carbon nanotubes using said catalyst particles and one or more carbon sources." Dillon teaches a reactor. *See e.g.* (Dillon "Fig. 1"). As to Claim 73, a reactor is taught. (Dillon "Fig. 1"). As to Claim 74, a hot wire generator is taught. (Dillon 5: 5-12). As to Claim 75, Dillon teaches at least a "source supplying energy to said means for producing catalyst particles." (Dillon "Fig. 1") (Power Supply). As to Claim 76, the means for producing the catalyst particles disclosed by Dillon, namely the ferrocene supply taught at *e.g.* (Dillon 5: 8) contains material included in one or more catalyst particles, namely iron. As to Claim 79, notwithstanding the ambiguities noted above, Dillon teaches controlling wall temperature by adding multiple hot filaments. *See e.g.* (Dillon "Fig. 4").

III. Claims 55-61, 63-68, 70, 72-73, 75-77 and 79 are rejected under 35 U.S.C. 102(b) as being anticipated by WO 02/076887 to Simard, et al.

With respect to Claim 55, this claim requires "producing catalyst particles by physical vapor nucleation of catalyst material or by solution droplet thermal decomposition of catalyst precursor or by aerosolization from a powder or suspension." Simard teaches formation of nanoparticles of the metal catalyst via laser ablation and aerosolization. (Simard 5: 11; "Fig. 2")). Claim 55 further requires "using said catalyst particles and one or more carbon sources in a reactor to produce carbon nanotubes." Simard teaches growth of nanotubes. *See e.g.* (Simard 11: 7) ("Example 2 – Formation of Nanotubes"). As to Claim 56, metals are taught. *Id.* ("Co:Mo metal"). As to Claim 57, at least laser ablation is taught. *Id.* ("The metal is exposed to a YAG laser"). As to Claim 58, radiative heat transfer is taught. *See e.g.* (Simard 9: 5; "Fig. 2") (discussing furnace). As to Claim 59, catalyst particles are produced before nanotube growth. *See e.g.* (Simard 11: 7) ("Example 2 – Formation of Nanotubes"). As to Claim 60-61, Simard teaches

forming a desired level of metal content in solution, *i.e.* classifing by mass or solubility. (Simard 12: 4). Note also classification by size taught at e.g. (Simard 10: 4) (describing a filter). As to Claim 63, hydrocarbons are taught. (Simard 10: 4) ("hydrocarbon solution").As to Claim 64, toluene is taught. (Simard 11: 7). As to Claim 65, multiple reagents are taught. *See e.g. Id.* As to Claim 66-67, notwithstanding ambiguities noted elsewhere, a chemical reaction with catalyst precursors to make nanotubes is taught. *See e.g. Id.* As to Claim 68, hydrogen is taught. (Simard 8: 3). As to Claim 70, the reactor as show has a residence time that can be controlled by controlling the feedstock rate, taught at (Simard 10: 2; "Fig. 2").

With respect to Claim 72, this claim requires "means for producing catalyst particles by physical vapor nucleation of catalyst material or by solution droplet thermal decomposition of catalyst precursor or by aerosolization from a powder or suspension." Simard teaches means for producing catalyst particles by laser ablation. *See e.g.* (Simard 10: 1; "Fig. 2"). Claim 72 further requires "one or more reactors for producing carbon nanotubes using said catalyst particles and one or more carbon sources." A reactor is taught. *Id.* As to Claim 73, a pre-reactor (comprising the laser/target, etc.) is taught. (Simard "Fig. 2"). As to Claim 75, at least a particle classifier is taught. (Simard 10: 4) (filter). As to Claim 76, the means for producing the particles have material include in the catalyst. *See e.g.* (Simard 10: 1) ("bulk metal catalyst"). As to Claim 79, the reactor has a length. (Simard "Fig. 2").

IV. Claims 55-66, 70, 72-73, 75-76 and 79 are rejected under 35 U.S.C. 102(b/a) as being anticipated by Sato, et al., *Growth of diameter-controlled carbon nanotubes using monodisperse nickel nanoparticles obtained with a differential mobility analyzer*, Chemical Physics Letters 2003; 382: 361-366 (hereinafter "Sato at __").

Note that Sato is 102(b) prior art against the international application, and 102(a) art should Applicants perfect their foreign priority.

With respect to Claim 55, this claim requires "producing catalyst particles by physical vapor nucleation of catalyst material or by solution droplet thermal decomposition of catalyst precursor or by aerosolization from a powder or suspension." Sato teaches vaporizing a nickel catalyst material. (Sato at 362, col 2 & "Fig. 1"). Claim 55 further requires "using said catalyst particles and one or more carbon sources in a reactor to produce carbon nanotubes." Nanotubes are produced. (Sato at 363, col. 2). As to Claim 56, nickel is taught. (Sato at 362, col 2 & "Fig. 1"). As to Claim 57, laser ablation is taught. *Id*. As to Claim 58, the helium cools the particles. *Id*. As to Claim 59, the particles are produced before making nanotubes. (Sato at 363, col. 2). As to Claims 60-62, the particles are size classified with a differential mobility analyzer. (Sato at 362, col. 2) ("2. experimental"). As to Claims 63-64, acetylene (a hydrocarbon) is taught. (Sato at 363, col. 1). As to Claims 65-66, argon participates in the reaction. *Id*. As to Claim 70, at least temperature is controlled. *Id*.

With respect to Claim 72, this claim requires "means for producing catalyst particles by physical vapor nucleation of catalyst material or by solution droplet thermal decomposition of catalyst precursor or by aerosolization from a powder or suspension." Sato teaches a laser ablation apparatus. (Sato at 362, col 2 & "Fig. 1"). Claim 72 further requires "one or more reactors for producing carbon nanotubes using said catalyst particles and one or more carbon sources." A reactor is taught. (Sato at 363, col. 1) ("CVD chamber"). As to Claim 73, "pre-reactors" are taught. (Sato at 362, col 2 & "Fig. 1"). As to Claim 75, at least a particle classifier is taught. *Id*. As to Claim 76, the "means for producing" the catalyst contains nickel, which is

included in the catalyst particle. *Id.* As to Claim 79, temperature is controlled. (Sato at 363, col. 1).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

I. Claims 80-82, 85 and 86-89 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kamalakaran, *Synthesis of thick and crystalline nanotube arrays by spray pyrolysis*, Applied Physics Letters 2000; 77(21): 3385-3387 in view of Zhang, et al., *Rapid growth of well-aligned carbon nanotube arrays*, Chemcial Physics Letters 2002; 362: 285-290 (hereinafter "Zhang at __") to show a state of fact.

With respect to Claim 80, this claim is a product-by-process claim. Product by process claims are not limited by the process limitations, except to the extent the process steps suggest structural or compositional features. *See generally* MPEP 2113. Rejections under 102/103 have

been approved for product-by-process claims. *Id.* Here, claim 55 (*i.e.* the process/method claim from which Claim 80 depends) merely suggests a carbon nanotube from a catalytic process, *i.e.* a catalyst may be present, for example at the end of the nanotube, although this is not necessarily required. The discussion of Claim 55 accompanying the anticipation rejection ("Rejection I") *supra* is expressly incorporated herein by reference. With respect to Claim 80, Kamalakaran teaches nanotubes. *See e.g.* (Kamalakaran at 3386) ("Fig. 2"). As to Claim 81, any number of properties including walls and/or purity are controlled. (Kamalakaran at 3386, col. 2). As to Claim 82, transition metals are taught. (Kamalakaran at 3387, col. 1). As to Claim 85, the nanotubes are deposited on a surface. (Kamalakaran at 3386, col. 1) ("Fig. 2").

With respect to Claim 86, notwithstanding ambiguities associated with this claim, nanotubes (*i.e.* "a functional material") are taught. *Id.* As to Claim 87, a film is taught. (Kamalakaran at 3386, col. 1) ("Fig. 2"). As to Claim 88, these are process limitations that only suggest the deposition of nanotubes, taught by Kamalakaran. *Id.* Furthermore, note that the nanotubes form by "diffusional" or "gravitational" forces. As to Claim 89, no structural features are imparted by jet focusing. A film is still taught. *Id.*

II. Claim 68 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kamalakaran, *Synthesis of thick and crystalline nanotube arrays by spray pyrolysis*, Applied Physics Letters 2000; 77(21): 3385-3387 in view of Zhang, et al., *Rapid growth of well-aligned carbon nanotube arrays*, Chemcial Physics Letters 2002; 362: 285-290 to show a state of fact as applied to claim 55 above, and further in view of:

(i) Maruyama, et al., *Low-temperature synthesis of high-purity single-walled carbon nanotubes from alcohol*, Chemical Physics Letters 2002; 360: 229-334 (hereinafter "Maruyama at __").

The discussion of Claim 55 accompanying the anticipation rejection *supra* is expressly incorporated herein by reference. As to Claim 68, to the extent Kamalakaran *may* not disclose

employing the reagents as claimed, these are known in the art. The Examiner takes official notice that they are. In support of taking official notice (*i.e.* in making sure there is substantial evidence on the record), the Examiner provides Maruyama (teaching alcohols at *e.g.* Maruyama at 230, col. 1). One would be motivated to employ an alcohol as a substitute for the hydrocarbon of Kamalakaran, as Maruyama teaches that alcohols reduce amorphous carbon formation and produce high purity carbon nanotubes. (Maruyama at 230, col. 1). Note also that alcohols provide for lower temperature synthesis, which suggests lower energy costs. *Id.*

III. Claim 69 and 83-84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamalakaran, *Synthesis of thick and crystalline nanotube arrays by spray pyrolysis*, Applied Physics Letters 2000; 77(21): 3385-3387 in view of Zhang, et al., *Rapid growth of well-aligned carbon nanotube arrays*, Chemcial Physics Letters 2002; 362: 285-290 to show a state of fact as applied to claim 55 above, and further in view of:

(i) Thostenson, *Advances in the science and technology of carbon nanotubes and their composites: a review*, Composite Science and Technology 2001; 61: 1899-1912 (hereinafter "Thostenson at __"),

(ii) US 6,426,134 to Lavin, et al., and

(iii) US 6,599,961 to Pienkowski, et al.

The discussion of Claim 55 accompanying the anticipation rejection *supra* is expressly incorporated herein by reference. As to Claim 69, to the extent Kamalakaran *may* not disclose the addition of an additive to create a composite, this does not impart patentability. Composites containing carbon nanotubes are old and known, and the Examiner takes official notice that they are. In support of taking official notice (*i.e.* in making sure there is substantial evidence on the record), the Examiner provides Thostenson, Lavin and Pienkowski. *See e.g.* (Thostenson at 1907, col. 2 *et seq.*)(discussing nanotube composites), (Lavin 2: 25 *et seq*) (discussing nanotube composites) *and* (Pienkowski 4: 10 *et seq.*) (discussing PMMA nanotube composites). A post-growth processing step of making a composite is well within the skill in the art as demonstrated

from the references of record, and such a step appears to be mere combination of known elements to obtain predictable results. This does not impart patentability. *See* MPEP 2143. Furthermore, note the various teachings, suggestions and motivations in the documents, for example the known properties of carbon nanotubes. *See e.g.* (Pienkowski at 1907, col. 2) ("The reported exceptional properties of nanotubes have motivated others to investigate experimentally the mechanics of nanotube-based composite films."). As to Claims 83-84, these claims are product-by-process claims. They depend from Claim 80, which requires carbon nanotubes. Nanotubes are taught. (Kamalakaran at 3386). Claims 83-84 recite the product resulting from the combination of the known processes taught in Kamalakaran, Thostenson, Lavin and Pienkowski.

IV. Claim 71 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kamalakaran, *Synthesis of thick and crystalline nanotube arrays by spray pyrolysis*, Applied Physics Letters 2000; 77(21): 3385-3387 in view of Zhang, et al., *Rapid growth of well-aligned carbon nanotube arrays*, Chemical Physics Letters 2002; 362: 285-290 to show a state of fact as applied to claim 55 above, and further in view of:

(i) Vivekchand, et al., *Carbon nanotubes by nebulized spray pyrolysis*, Chemical Physics Letters 2004; 386: 313-318 (hereinafter "Vivekchand at __").

The discussion of Claim 55 accompanying the anticipation rejection *supra* is expressly incorporated herein by reference. As to Claim 71, to the extent Kamalakaran *may* not disclose the addition of multiple catalyst supplies, this does not impart patentability. Vivekchand employs multiple catalyst sources, and they give rise to isolated SWNTs. (Vivekchand at 317, col. 2) ("Pyrolysis of cobaltocene and nickelocene in mixture with toluene gave isolated SWNTs."). One would be motivated to employ multiple catalysts as taught by Vivekchand to make isolated SWNTs versus MWNTs, etc.

V. Claims 80-82 and 85-89 are rejected under 35 U.S.C. 102(b/e/a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over WO 03/056078 to Dillon, et al. (US 2004/0265211 A1) in view of Zhang, et al., *Rapid growth of well-aligned carbon nanotube arrays*, Chemical Physics Letters 2002; 362: 285-290 to show a state of fact.

The discussion of product-by-process claims accompanying "Rejection I," *supra* is expressly incorporated herein by reference. With respect to Claim 80, Dillon teaches nanotubes. *See e.g.* (Dillon 2: 9) ("single-wall carbon nanotube"). As to Claim 81, the number of walls is controlled. *Id.* As to Claim 82, Dillon suggests the presence of transition metals in the nanotube material. (Dillon 5: 13-18). As to Claim 85, the nanotubes are deposited on a surface. (Dillon "Fig. 1" *and* 3: 12 *et seq.*).

With respect to Claim 86, and notwithstanding all of the ambiguities associated with this claim, the claim is being interpreted as requiring nothing more than Claim 80, *i.e.* a carbon nanotube. The discussion above is relied upon. As to Claim 87, films are taught. (Dillon "Fig. 1" *and* 3: 12 *et seq.*). As to Claim 88-89, these claims recite process limitations that describe how the film is deposited. These methods do not appear to impart any structural features. See discussion of Claim 87.

VI. Claim 69 and 83-84 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 03/056078 to Dillon, et al. (US 2004/0265211 A1) in view of Zhang, et al., *Rapid growth of well-aligned carbon nanotube arrays*, Chemical Physics Letters 2002; 362: 285-290 to show a state of fact as applied to claim 55 above, and further in view of:

(i) Thostenson, *Advances in the science and technology of carbon nanotubes and their composites: a review*, Composite Science and Technology 2001; 61: 1899-1912 (hereinafter "Thostenson at __"),

(ii) US 6,426,134 to Lavin, et al., and

(iii) US 6,599,961 to Pienkowski, et al.

The discussion of Claim 55 accompanying the anticipation rejection *supra* is expressly incorporated herein by reference. As to Claim 69, to the extent Dillon *may* not disclose the

addition of an additive to create a composite, this does not impart patentability. Composites containing carbon nanotubes are old and known, and the Examiner takes official notice that they are. In support of taking official notice (*i.e.* in making sure there is substantial evidence on the record), the Examiner provides Thostenson, Lavin and Pienkowski. *See e.g.* (Thostenson at 1907, col. 2 *et seq.*)(discussing nanotube composites), (Lavin 2: 25 *et seq*) (discussing nanotube composites) *and* (Pienkowski 4: 10 *et seq.*) (discussing PMMA nanotube composites). A post-growth processing step of making a composite is well within the skill in the art as demonstrated from the references of record, and such a step appears to be mere combination of known elements to obtain predictable results. This does not impart patentability. *See* MPEP 2143. Furthermore, note the various teachings, suggestions and motivations in the documents, for example the known properties of carbon nanotubes. *See e.g.* (Pienkowski at 1907, col. 2) ("The reported exceptional properties of nanotubes have motivated others to investigate experimentally the mechanics of nanotube-based composite films."). As to Claims 83-84, these claims are product-by-process claims. They depend from Claim 80, which requires carbon nanotubes. Nanotubes are taught. *See e.g.* (Dillon 3: 12 *et seq.*). Claims 83-84 recite the product resulting from the combination of the known processes taught in Dillon, Thostenson, Lavin and Pienkowski.

VII. Claim 71 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 03/056078 to Dillon, et al. (US 2004/0265211 A1) in view of Zhang, as applied to claim 55 above, and further in view of:

(i) Vivekchand, et al., *Carbon nanotubes by nebulized spray pyrolysis*, Chemical Physics Letters 2004; 386: 313-318 (hereinafter "Vivekchand at __").

The discussion of Claim 55 accompanying the anticipation rejection *supra* is expressly incorporated herein by reference. As to Claim 71, to the extent Dillon *may* not disclose the addition of multiple catalyst supplies, this does not impart patentability. Vivekchand employs multiple catalyst sources, and they give rise to isolated SWNTs. (Vivekchand at 317, col. 2) ("Pyrolysis of cobaltocene and nickelocene in mixture with toluene gave isolated SWNTs."). One would be motivated to employ multiple catalysts as taught by Vivekchand to make isolated SWNTs versus MWNTs, etc. Note also that Dillon explicitly provides for "a wide range of gas delivery systems," etc. (Dillon 10: 13).

VIII. Claims 80-82 and 85-89 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over WO 02/076887 to Simard, et al.

The discussion of product-by-process claims accompanying "Rejection I," *supra* is expressly incorporated herein by reference. With respect to Claim 80, carbon nanotubes are taught. (Simard "Fig. 7"). As to Claim 81, diameter and other properties are controlled. (Simard 11: 1). As to Claim 82, transition metals are attached. (Simard "Fig. 8"). As to Claim 85, at least those nanotubes captured in the micrographs ("Figs. 7-8") of Simard were "deposited on a surface," as required by the claim. As to Claim 86-89, and notwithstanding all of the ambiguities associated with these claims, nanotubes are taught and they can be interpreted as a "line," or a layer of structures. *See e.g.* (Simiard "Figs. 7-8").

IX. Claim 69 and 83-84 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 02/076887 to Simard, et al. as applied to claim 55 above, and further in view of:

(i) Thostenson, *Advances in the science and technology of carbon nanotubes and their composites: a review*, Composite Science and Technology 2001; 61: 1899-1912 (hereinafter "Thostenson at __"),
(ii) US 6,426,134 to Lavin, et al., and
(iii) US 6,599,961 to Pienkowski, et al.

The discussion of Claim 55 accompanying the anticipation rejection *supra* is expressly incorporated herein by reference. As to Claim 69, to the extent Simard *may* not disclose the addition of an additive to create a composite, this does not impart patentability. Composites containing carbon nanotubes are old and known, and the Examiner takes official notice that they are. In support of taking official notice (*i.e.* in making sure there is substantial evidence on the record), the Examiner provides Thostenson, Lavin and Pienkowski. *See e.g.* (Thostenson at 1907, col. 2 *et seq.*)(discussing nanotube composites), (Lavin 2: 25 *et seq*) (discussing nanotube composites) *and* (Pienkowski 4: 10 *et seq.*) (discussing PMMA nanotube composites). A post-growth processing step of making a composite is well within the skill in the art as demonstrated from the references of record, and such a step appears to be mere combination of known elements to obtain predictable results. This does not impart patentability. *See* MPEP 2143. Furthermore, note the various teachings, suggestions and motivations in the documents, for example the known properties of carbon nanotubes. *See e.g.* (Pienkowski at 1907, col. 2) ("The reported exceptional properties of nanotubes have motivated others to investigate experimentally the mechanics of nanotube-based composite films."). As to Claims 83-84, these claims are product-by-process claims. They depend from Claim 80, which requires carbon nanotubes. Nanotubes are taught. *See e.g.* (Simard "Fig. 8"). Claims 83-84 recite the product resulting from the combination of the known processes taught in Simard, Thostenson, Lavin and Pienkowski.

X. Claims 80-82 and 85-89 are rejected under 35 U.S.C. 102(b/a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Sato, et al., *Growth of diameter-controlled carbon nanotubes using monodisperse nickel nanoparticles obtained with a differential mobility analyzer*, Chemical Physics Letters 2003; 382: 361-366.

The discussion of product-by-process claims accompanying "Rejection I," *supra* is expressly incorporated herein by reference. With respect to Claim 80, carbon nanotubes are taught. (Sato at 365). As to Claim 81, diameter is controlled. *Id*. As to Claim 82, catalyst particles (*i.e.* transition metals) are attached. *Id*. As to Claim 85, nanotubes are deposited on a surface. (Sato at 365, Fig. 3(a)). As to Claim 86, this claim is interpreted as requiring nothing more than nanotubes, taught by Sato. (Sato at 365). As to Claims 87-89, a layered material is taught (Sato at 365, Fig. 3(a)), and the process steps do not appear to suggest any structure beyond nanotubes.

XI. Claims 71 and 77-78 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato, et al., *Growth of diameter-controlled carbon nanotubes using monodisperse nickel nanoparticles obtained with a differential mobility analyzer*, Chemical Physics Letters 2003; 382: 361-366.

The discussion of Sato accompanying the anticipation rejection ("Rejection IV") *supra* is expressly incorporated herein by reference. As to Claim 71, this claim requires two or more catalyst particle suppliers. Sato appears to disclose only one. One would be motivated to add at least catalyst supplier to scale up the process and accommodate more catalyst formation and placement on the substrate, etc. As to Claim 77 this claim requires two or more pre-reactors. Sato appears to disclose only one pre-reactor. One would be motivated to add at least another pre-reactor to scale up the process and accommodate more catalyst formation and placement on the substrate, etc. Note also that duplication of parts does not impart patentability. MPEP 2144.04

VI. B. Likewise, with respect to Claim 78, operating two reactors in parallel to create nanotubes with different diameters is within the skill in the art, as demonstrated by Sato.

XII. Claims 66-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato, et al., *Growth of diameter-controlled carbon nanotubes using monodisperse nickel nanoparticles obtained with a differential mobility analyzer*, Chemical Physics Letters 2003; 382: 361-366 in view of (i) Maruyama, et al., *Low-temperature synthesis of high-purity single-walled carbon nanotubes from alcohol*, Chemical Physics Letters 2002; 360: 229-334.

The discussion of Claim 55 accompanying the anticipation rejection *supra* is expressly incorporated herein by reference. As to Claim 66-68, to the extent Sato *may* not disclose employing the reagents as claimed, these are known in the art. The Examiner takes official notice that they are. In support of taking official notice (*i.e.* in making sure there is substantial evidence on the record), the Examiner provides Maruyama (teaching alcohols at *e.g.* Maruyama at 230, col. 1). One would be motivated to employ an alcohol as a substitute for the hydrocarbon of Sato, as Maruyama teaches that alcohols reduce amorphous carbon formation and produce high purity carbon nanotubes. (Maruyama at 230, col. 1). Note also that alcohols provide for lower temperature synthesis, which suggests lower energy costs. *Id.*

XIII. Claim 69 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato, et al., *Growth of diameter-controlled carbon nanotubes using monodisperse nickel nanoparticles obtained with a differential mobility analyzer*, Chemical Physics Letters 2003; 382: 361-366 as applied to claim 55 above, and further in view of:

(i) Thostenson, *Advances in the science and technology of carbon nanotubes and their composites: a review*, Composite Science and Technology 2001; 61: 1899-1912 (hereinafter "Thostenson at __"),

(ii) US 6,426,134 to Lavin, et al., and

(iii) US 6,599,961 to Pienkowski, et al.

The discussion of Claim 55 accompanying the anticipation rejection *supra* is expressly incorporated herein by reference. As to Claim 69, to the extent Sato *may* not disclose the addition of an additive to create a composite, this does not impart patentability. Composites containing carbon nanotubes are old and known, and the Examiner takes official notice that they are. In support of taking official notice (*i.e.* in making sure there is substantial evidence on the record), the Examiner provides Thostenson, Lavin and Pienkowski. *See e.g.* (Thostenson at 1907, col. 2 *et seq.*)(discussing nanotube composites), (Lavin 2: 25 *et seq*) (discussing nanotube composites) *and* (Pienkowski 4: 10 *et seq.*) (discussing PMMA nanotube composites). A post-growth processing step of making a composite is well within the skill in the art as demonstrated from the references of record, and such a step appears to be mere combination of known elements to obtain predictable results. This does not impart patentability. *See* MPEP 2143. Furthermore, note the various teachings, suggestions and motivations in the documents, for example the known properties of carbon nanotubes. *See e.g.* (Pienkowski at 1907, col. 2) ("The reported exceptional properties of nanotubes have motivated others to investigate experimentally the mechanics of nanotube-based composite films."). As to Claims 83-84, these claims are product-by-process claims. They depend from Claim 80, which requires carbon nanotubes. Nanotubes are taught. *See e.g.* (Simard "Fig. 8"). Claims 83-84 recite the product resulting from the combination of the known processes taught in Sato, Thostenson, Lavin and Pienkowski.

XIV. Claims 80-81 and 85 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bandyopadhyaya, et al., *Stabilization of Individual Carbon Nanotubes in Aqueous Solutions*, Nano Letters 2002; 2(1): 25-28.

The discussion of product-by-process claims accompanying "Rejection I," *supra* is expressly incorporated herein by reference. With respect to Claim 80, carbon nanotubes are taught. (Bandyopadhyaya at 25). As to Claim 81, diameter is controlled. *Id*. As to Claim 85, the nanotubes are dispersed in a liquid. (Bandyopadhyaya at 26).

XV. Claims 80 and 82-85 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Thostenson, *Advances in the science and technology of carbon nanotubes and their composites: a review*, Composite Science and Technology 2001; 61: 1899-1912 (hereinafter "Thostenson at __").

The discussion of product-by-process claims accompanying "Rejection I," *supra* is expressly incorporated herein by reference. With respect to Claims 80 and 82-85, Thostenson teaches polymer-nanotube composites. (Thostenson at 1907, col. 2).

XVI. Claims 80 and 82-85 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 6,426,134 to Lavin, et al.

The discussion of product-by-process claims accompanying "Rejection I," *supra* is expressly incorporated herein by reference. With respect to Claims 80 and 82-85, Lavin teaches polymer-nanotube composites. *See e.g.* (Lavin "Abstract").

XVII. Claims 80 and 82-85 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 6,599,961 to Pienkowski, et al.

The discussion of product-by-process claims accompanying "Rejection I," *supra* is expressly incorporated herein by reference. With respect to Claims 80 and 82-85, Pienkowski teaches polymer-nanotube composites. *See e.g.* (Pietkowski "Abstract").

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Nasibulin, et al., *A novel aerosol method for single walled carbon nanotube synthesis*, Chemcial Physics Letters 2005; 402: 227-232. This would appear to be the journal article accompanying the instant application. Consultation of the "Science Direct" website reveals that the Nasibulin reference was published online on 28 December 2004. While an intervening reference between Applicants foreign priority document and the international application, identity of authorship and inventorship precludes application of the reference under 35 U.S.C. 102(a).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL C. MCCRACKEN whose telephone number is (571)272-6537. The examiner can normally be reached on Monday through Friday, 9 AM - 6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley S. Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Daniel C. McCracken/
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